

Full Length Research Paper

Learning methods for efficient adoption of contemporary technologies in architectural design

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The interaction between technology and history is one of the most significant issues in achieving an efficient and progressive architecture in any era. This is a concept which stems from lesson of traditional architecture of Iran. Architecture as a part of art, has permanently been transforming just like a living organism. In fact, it has been placed in a dialectic trend. Previously, the education based on teacher-student system which was in companion with the spirit of the time and architectural style in any historical era was clearly illustrating principles of the architecture of that era. The existence of complexity and contrary in evolving science and technology and following it in art and architectural styles has always been influencing education in the field of architecture. Getting to know scientific spirit and culture of each era and explicitly the recent years and regulating architectural lessons according to scientific, developments and complexities will make architecture a living and dialectic part of science. The purpose of this investigation is to know dialectic thoughts about education in the field of architecture as a part of science and its transitions in the context of history. Descriptive research method has been adopted to do the research.

keywords: Dialectic, Science, Architectural education, Architecture schools

INTRODUCTION

Generally, architectural education is categorized in two types of teacher-student system and academic education. The former one had been common before the academies and schools of art and architecture were established. However, the latter as the other sciences is one of the methods belonging to the contemporary centuries in broadening and specializing the science.

The contrasts and complexities which exist in the history of architecture and therefore teaching architecture, are in a dialectic trend. The way of teaching architecture is not far from teaching other sciences and

should be bound to changes in teaching methods and use the modern educational values. The history of architecture shows that artists and architects have always been aware of the spirit of their time and have tried to develop with the society and its transitions. Now, the need of coordinating architectural education with scientific and social transitions and human's view to the world, requires recognizing historical transitions of science and architecture through the history. This article puts this issue into perspective having a dialectic view.

Statement of Issue and Methodology

The research questions

- 1) How has teaching architecture been evolved since the past till now? How has been the process?
- 2) How is the trend of changes and traditions of history of sciences related to architecture, teaching architecture and how is it possible to create a relation between modern technology and historical context of architectural designs?

The research purposes

The purpose of this research is to recognize dialectic trend of architectural education in its historical-cultural context, just like a scientific trend.

The research method

This investigation adopts a descriptive analytic approach and combined methods. In descriptive researches the researcher is looking for circumstances of the issue and trends to know how the phenomenon, variable, object or subject is. In other words, this research investigates the current condition and then describes it well-organized and systematically and surveys its traits and checks the relations between the variables, if necessary. (Grout and Wang, 2005). In this method, the information is obtained from publications and other written resources.

Literature Review

The philosophy of dialectic

The philosophy of Hegel is a combination of Idealistic thoughts. The term which is known as dialectic trend is an issue in philosophy of Hegel which affects the world's view, particularly with publicizing Marx's views. The dialectic trend means that everything is breeding its opposite. Hegel knows it as a combination of a tri-fold movement which consists of thesis, antithesis and synthesis.

Constantly, synthesis will be a thesis again and this cycle continues so that it finishes in the absolute idea. Marx applied the dialectic and founded his theories on history's movement and decline of Capitalism, as economy of slavery was subdued by Feudalism and economy of Feudal was vanquished by Monarchy. In Marx's philosophy, scientific founding, scientific logic and scientific systems were underlined emphatically. (Mazini, 1386)

This philosophical approach is the source of recognition, because its structure forms with the

movement which is the basic feature of the substance and explains the system of movement. It is so easy to recognize dialectic as a philosophical approach. However, recognizing the movements of objects of the study is complex and needs knowing their specific laws by using the related sciences. Hence, using the law comes into existence in the framework of dialectic approach, consciously or unconsciously. Reasoning that everything in the world is continually moving and changing and this movement is following a specific mechanism and system, as it is not monotonous but the quality and essence of the existent is changing and it is denaturing. Furthermore, the perpetual movement of any creature shows that its present position is a limbo between the past and future and means that its previous condition is permanently replaced by the future's and when the future comes to existence, it will be looking forward to a newer future or the newer future will be imposed on it. So, if these two actors of the past and the future are called in well known names, the past will be called Thesis and the future will be named Antithesis and in the end, this active approach will be called Synthesis in its any chosen section. This choice may consider a small or a great phenomenon; The fulfillment of this approach is called Contrast. (Rostam pour, 1388) Dialectic explains the most holistic law among creatures. This law is philosophical because it is widespread and makes an important part of philosophy which will help us get our scientific goals more easily while using scientific laws, principles and orders, if it is taken as our practical and analytical method and guide.

The necessity of dialectic learning

In this century, dialectic was hold forth conventionally as the main law of movement of the substance. The intellectual bases of these principles were compiled by the German philosopher, Hegel and were coordinated with the world's general reality by Carl Marx, another philosopher of the same country. Knowing these principles gives human beings a view which helps them get through the long way of knowing the world. In general, using the dialectic method is prerequisite but not enough for knowing the existence. It would be enough if only the specific laws of each field of science were used so as to know the objects of study. Explaining dialectic principles encourages the human to know the world mutually and leads him in turn. Dialectic principles assign some laws which are applicable to all the creatures, including inanimate world, organisms, society and human's thoughts. Dialectic principles as philosophical bases, indicate the most holistic laws dominant in creatures' movements and is the way of thinking and explaining and analyzing the realities properly, at the same time. In other words, we think as much correctly as our thoughts are in conformity with the reality in the world

out of our minds. They are subsets of dialectic principles which are the rules of the world's general movement.

The history of dialectic science and thought

Unconsciousness in a scientific culture should be psychoanalyzed thoroughly. The scientific thoughts are based on reforming the past and is basically in a perpetual and constant revolution and nowadays the technical science which consists of inquirable thoughts and experiments which have been carefully proved. The science is standing in a position in which should not be considered the continuation of transmutation, by mistake. However, the discussion is not about continuity and perpetuation but it is a dialectic confrontation, as we are not allowed to confirm the unity of transmutation and commutability. Accepting this unity is the same as confusing values which is actually followed by neglecting and failing in performing philosophical responsibilities. The scientific benefits should be focused in order to enact and set up the truly scientific values. (Bachelard, 1383) It is seriously warned that thinking about results of the science would be misled, unless thesis benefits were truly scientific.

Now, if the matter of freshness of the scientific spirit is discussed psychologically, you will certainly find out that the revolutionary spirit of contemporary science must influence deeply on the structure of mind and be reflected in it. Accepting that the recognition has a history, it should be confirmed that the structure of mind is changing. Actually, the history of human in companion with infatuations and prejudgments may be considered as it is beginning through all the times. However, there are some thoughts which will never be renewed. These thoughts are the modified and developed and completed thoughts and they will not go back to their previous limited or slippery conditions. Because the scientific spirit is basically modifying the knowledge and developing the recognition and is condemning its historical past times. It is aware of the historical misconceptions. Scientifically, the truth means correcting the long lasting misconception historically and experience means correcting a common mistake. The difference between recognition and the unknown is dialectically the basis of intellectual life of the science. Knowing what we did not know is the nature of thinking. The thoughts which are not related to Bacon, Oghlidos or Descartes will be appeared as correcting a misconception, developing a system and completing an idea in these historic dialectics. If the philosophy of scientific recognition is considered an open philosophy, it will be brought to existence through searching in reality to discover something to break the last knowledge. It is certainly proved that a new experience should deny the old experience. Otherwise, it will not be known as the new one. However, this negation is not fixed for a mind which has dialectic beliefs and has based some new

types of improvisation. (Bachelard, 1383)

Society in a dialectic historical basis

Marx believes that history involves the process of expanding and transformations and it is getting evolved gradually and this can apply to every field from the nature to the social and political life and the human's thoughts, as well. The human's behavior and thoughts are influenced by the dominant spirit which is in fact, the spirit of that time. (Mazini, 1386, p.135) In Marx' opinion "revolution" is the logical result of his critical view rather than the effect of optimism or a strategic mistake. Because "this view does not address just some of the faults of the society. To this view, those faults are essentially related to the society as a whole. "(Traditional thesis and critical thesis, Horkheimer) Revolution is the only phenomenon which can fill the gap between the current unfair condition and a relieving situation. Therefore, Marx's critics desire such a condition which is substituted, as he knows the current situation, to an impossible issue. Revolution is the way of facing the whole organism of the society. Although this view believes that the future condition will emerge from the current condition, it is totally emptying it from undesirable elements and ignoring the possibility of transforming of different forms of unfairness. To Hegel and Marx, dialectic was exclusively meant to an exceptional situation and was not even mentioned before and after that. Milan Kundera in his famous novel, *The load of existence*, wisely called the left ideal as the great demonstration. The enchantment of a great demonstration which will destroy the present construction of society and will build a new one. (Tamjidi, 1386)

Dialectic approach to architectural education

The social transitions and the styles in architecture

The prevailing style in western countries has been changed constantly. The systematic order has always been changing from simplicity to intricacy until getting saturated and then turning back to a simple order. (Groter, 1390) Changing styles require the forms to be changes and also the language of these signs which are changed with, should be comprehensible. (Groter, 1390) Making a new style accepted by the public in dependant on its language, which reflects its cultural symbolic contents to be understandable. Adolf Vogt proved that transformation of architecture styles can be influenced by the political, economical circumstances directly and if this situation is repeated, it will be recognized in architectural style, too. "Transformation in architecture before, along and after the revolution of France and the revolution of Russia are almost the same. Before the conservative

Table 1. The order in architectural styles is conformed to the stage of dialectic thinking

Steps of dialectic thinking	First step	Second step	Third step
Dialectic process	Thesis	Antithesis	Synthesis
Order in architectural styles	Simple order	Intricate order	Period of saturation

Table 2. Teaching architecture is changed by scientific and technological developments.

Scientific developments	Alchemy	New discoveries	New physics
Architecture	Classical architecture	Modern architecture	Jump cosmic architecture
Teaching architecture	Traditional teaching	Academic teaching	New teaching

regime, it seems that geometric and structural forms are preferred, but it tends to Classicism after winning the revolution." (Groter, 1390)

Generally, it seems that transformations of architectural styles are affected by scientific, economic transitions and political conditions and social transformations. (Table 1)

Transitions in architectural education

From the beginning of the 20th. century, architecture followed the transitions of the time and was influence by which is totally named "life" or "modern qualities". Ignoring the old theories presenting newer ones was almost common in the field of science. Doubting about 'cause and effect' and explaining it mathematically thorough analytical algebra was such an instance and opposing the theory of evolution which had been presented by Le Mark and Darwin was another good example. (Mazini, 1386) The industrial developments were based on scientific advancements. Modern improvements which began with Copernican discoveries in astronomy, reflected the science more comprehensively. On the one hand, answers to human's old unknown questions were found in the field of science and on the other hand, a new insight was created which was different from the last one. Therefore theories in philosophy and humanity were changed following the observations which were manifested in the field of science. (Mazini, 1386) Developing experimental sciences especially in physics, mathematics and biology in the 18th. and the 19th. century was a model for engineers and architects to fulfill ambitions of their people. (Memarian, 1387) They believed applying the knowledge exclusively in architecture gave it a scientific aspect.

Modernism broke down the mere imitation of classical merits in architecture and it was exchanged with freedom and it created a spectrum in architecture consisting works of such architects as from Gaudi, Hanes Sharon and Mendelssohn to Le Corbusier, Mies van der Rohe and Adolf Los. (Mazini, 1386) It was a social need to pass the classical architecture and end up in modern architecture,

from compensation to vacancy, from heaviness to lightness, from symbolism to functionalism and after all from composing a substance as a physical appearance of a divine abstraction to physical existence of the social needs. Walter Gropius, the German architect and founding father of Bauhaus - a school of architecture - who had a key role in developing the modern art, suggested that the new architecture is the logical result of the social and technical conditions of the new life rather than a sign of the creativity of the creator of the new form. However, after a while the younger architects refused following previous generations and passed the boundaries of the early freedom of the modernism. Robert Venturi's writings show the mentioned refusal clearly. Actually, the stimulant forces which created the modern architecture were changing gradually. Venturi opposed the famous architecture professors' principles thoroughly, without proposing a new way. Bozard demolished completely and some unprofessional architects began to teach there! Apparently, drawing and designing were put aside and discussions over socialism and capitalism were held, because they believed that the true architecture will not be created as long as capitalism is dominant in the world. Table 2.

Educating architects is necessary if only the present architecture lacks high quality and is not worth teaching. It is the same as beginning of Renaissance when newer definitions and meanings were sought with rejecting the Gothic architecture. Another example is when modern architecture was just born after demolishing the old architecture like Baroque, Neoclassic, Neogothic, etc. It was coincident with founding Bauhaus and discovering and attracting talents such as Gropius, Le Corbusier and Mies van der Rohe who had the chance to present new definitions and samples of architecture. Teaching architecture has a sense if only there is an integrated and accepted definition of architecture to be taught. Traditional education of architecture as studying in Bozard and Bauhaus considered an integrated definition of architecture. (Hojjat, 1382, p.64) Although there were radical differences between traditional and academic education, they had a clear definition of architecture in common.

Passing through traditional education to the modern

Traditional educating of architecture is the skills and principles transition from the teacher to the students through practice. This method belongs to a traditional society, which does not permit any innovation and art and crafts are considered as holy mother as the other issues. "In such a society every body's actions show his religious beliefs. As a poet their poems, as a creator their creation and as an artist their works of art and as architect their buildings were illustrating their beliefs and their way of thinking." Reflecting beliefs in acts of traditional human is natural and unconscious, rather than being on will.

In such a society, principles of architecture which are inspired by supersensible realities, are taught to students who are recipients, by the teachers who are not their creators. (Hojjat, 2002) In this way, teaching is the teacher's duty to transmit what they have obtained from the predecessors to those who are coming.

Previously, information and experiences in architecture were transmitted from the architect to his students. The architects used to build a building according to their experience in any section of time and in any situation. What was known as a new design was based on what was left by their predecessors. In other words, the architect was the heir of the ancient experiences. It can be called "the architectural culture" in architect's unconsciousness. The products of this heritage show "architectural culture" of any time and place. It truly means following and continuing the deceased way and apply their principles in the current cultural basis. (Memarian, 2008) This method which was the only and the best in its time and we are still proud of its results, is not possible to repeat anymore, because we are passing the past and entering to the new world and facing the new opportunities and new communications and the new understanding of "architecture". In this method, chest to chest education was going on practically when the buildings were being built. However, new needs lead to new definitions of architecture which did not exist before. New facilities make the architecture free of attaching to the nature and previous structures and local materials and require more sustainability with less harm to natural resources. (Hojjat, 2002)

Discussion and analysis of Results

Dialectic analysis in schools of architecture

Schools of architecture not only are efficient in bringing up young architects but also were some safe places of professors and places in which architectural philosophies leading to architectural transformations were formed. Almost all of the famous modern architects used to work in universities. Gropius and Mies van der Rohe not only taught in universities but also were founding fathers of their schools. Frank Lloyd Wright did not work in a

university but he had his own well-known school. Apparently, Le Corbusier did not have his schools but his small atelier in Soor street in Paris was like a school which thousands of architects the world over came to learn from him. Nowadays almost all the famous contemporary architects are related to schools of architecture. It shows that recent educational institutes have a fundamental role in extending and transforming architecture. (Mazini, 2007) Furthermore, the fact that modern movement in architecture lasted for decades and then demolished, shows the process led to appearance and then decline of Bauhaus as a symbol of educating architecture in modern instruction. (Hojjat, 2002) Modern teaching of architecture reached a deadlock and it was a sign of extinction of modernism in the west and beginning of another age -the Postmodernism.

There were two more influential institutions among the others in developing modern architecture. The fine arts in Paris and construction house in Germany. They had teaching art and architecture in common. Bozard lasted so long and was so old when the modern architecture was booming. Bauhaus was the offspring of modernism and modern architecture. Philosophically they were opposite of each other and in another word, Bauhaus was the antithesis of the former school and it caused some changes in programs of Bozard. (Mazini, 2007)

Updating the learning

Nowadays, schools of architecture should breed architects and train them not just educate them. The students should be equipped with ability, knowledge and insight. (Hojjat, 2003) Beginning the 21st. century, technology soared into the air which changed the earth. If schools do not change their curriculum, the comings will know too little about their technology. "People have never been so ignorant of the technology" said Burk when he discovered "technology literacy". So, we will not breed some people who do not know anything about technology. We should be aware that the methods which were successful in the past are not as useful for the future students. Technology is the result of human's brain and engineering. So, it is the effect of human's will and control. All technologies are developed to meet human's needs and depend on human's supervising. Johnson describes technology as a means of applying knowledge and skills work out practical problems and expanding human's abilities. (Hernandez and Rashmi, 2006)

The primitive experiences of technological developments (along with the industrial revolution) were mainly commercial. Instructors found out the importance of general teaching about materials. Practical intership and afterwards, industrial arts were launched. In this century, a new educational system -educating technology- has been launched to substituting skill-based education. This type of education contributes to

developing technological literacy and students can study how to innovate and apply compatible tools, machines, materials, techniques to the environment, society and human. (Hernandez and Rashmi, 2006)

The necessity of adopting a dialectic view for the future schools

If education is required to keep up with the 21st. century, it will be inevitable to give up the past paradigms and start a new way. Schools and instructors should act based on analyzing cultures, which consists of criticism and more and is more than criticizing cultures, rather than beliefs in transmutation. They should assign educational purposes and responsibilities so as to meet human's needs. Although it is not easy to anticipate details of future social systems, it seems that educational systems have to abandon approaches based on transmutation. The significant aspects of education cannot be left as technical-academic issues or mere rational. The new paradigm is establishing frameworks. This paradigm puts the elements of educational system together in a more accepted and more understandable framework. In conclusion, the new paradigms of educating architecture set aside the previous frameworks of educational system or modify and adapt them to the transitions of the time.

CONCLUSION

Following the definition mentioned in this article, dialectic is the dominant on all the changes. A law which express all corporal or not corporal aspects of existence. The styles of architecture have always been transforming and this event was exceeded after industrial revolution. The new conditions led to transforming the educational system to academic. The dialectic process of scientific development has influenced almost every political, social

and cultural views. The artists and architects have always conform themselves with the new conditions and never have isolated themselves of the changes happened in sciences and even sometimes they made those changes. The schools of architecture had a key role in making the changes. Zeitgeist (the spirit of the times) is a German term and modern architects attributed their new works and approaches to the spirit of their time. Le Corbusier, Wright, Gropius, Mies van de rohe knew their architecture the result of the new conditions. Nowadays, the developments of communication and information have actually made a new condition, so the architectural education needs to be revised. As the changes have always been made and will be made in future, so the people who are in charge of educating architecture should be aware and careful not to fall behind the scientific, social, cultural changes of the time and try to adjust teaching architecture with these changes. In Iran, the dialectic educational approach should be well-considered and the educational system should be adapted to the new educational criteria.

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